

REMARKS

Reconsideration and withdrawal of the rejections set forth in the Office Action dated December 1, 2005, is respectfully requested in view of this amendment. By this amendment, the Specification has been amended to cancel reference to a patent previously incorporated by reference. Claims 1 and 5 have been substantively amended and new claims 18 and 19 have been inserted. Claims 1-19 are pending in this application.

The amendment to claim 1 defines the encapsulant as an "encapsulating resin", and curing at a temperature no greater than 120 degrees C, such that said encapsulating resin at least partially cures at the same time as a process of reflowing the solder having the melting point or liquidus less than 120 degrees C. Support is found in the specification, *inter alia*, at page 9, lines 24-26.

The amendment to claim 5 defines the liquid encapsulant as an "encapsulating resin", and curing the encapsulating resin a temperature no greater than 120 degrees C. The claim describes the encapsulating resin as at least partially curing at the same time as a process of reflowing the solder. Support is found in the Specification, *inter alia*, at page 9, lines 24-28.

New claim 18 defines the solder bumps as comprising a solder with a melting point or liquidus less than 120 degrees C, at least partially curing at the same time as a process of reflowing the solder. Support is found in the Specification, *inter alia*, at page 9, lines 24-28. New claim 19 defines the encapsulating resin as capable of remelt at a temperature below 120 degrees C sufficiently to allow separation of the assembly after assembly and hardening. This is defined as permitting repair of the assembly without damage. Support is found in the Specification at page 15, lines 14-18.

In view of the amendments above and remarks set forth, Applicant respectfully requests reconsideration.

Rejections under 35 USC §103

Claims 1-17 were rejected under 35 USC 103(a) as being unpatentable over U.S. Patent No. 5,786,597 to Lingren, et al. (Lingren), taken in view of U.S. Patent No. 5,952,646 to Spartiotis, et al. (Spartiotis), U.S. Patent No. 6,017,634 to Capote, et al. (Capote '634), and U.S. Published Application 2003/0229986 to Su, et al. (Su). Reconsideration and withdrawal of the rejection is respectfully requested because the combination of Lingren, Spartiotis, Capote, and Su fail to teach or suggest all of the features recited in claims 1-17.

In the rejection, Lingren is cited as showing a radiation detector with a substrate, interposer and interconnect pads. Lingren was also cited as showing the use of a solder having a m.p. of less than 120°. Spartiotis was used to show the connection of readout cells, also by a low temperature solder having a m.p. of less than 120°, for merging a detector and an interposer, in a solder bump process. The rejection then posits that it would be obvious to modify Lingren to include low temperature solder bumps as taught by Spartiotis to provide a high resolution one-to-one correspondence at low temperature. This combination is acknowledged as lacking an encapsulating resin between the interposer and the detector. Capote '634 is cited as showing the use of an encapsulant as an underfill material, given by way of example as an epoxy polymer. Finally, Su was cited as describing a protective metallurgy layer in a solder bumping process.

Independent claim 1 recites:

"an interposer card ..., a plurality of interconnect pads ..., at least one readout semiconductor chip and at least one connector ...; solder columns that extend from contacts on the interposer first surface to the plurality of pads ... said solder columns comprising at least one solder having a melting point or liquidus less than 120 degrees C; and an encapsulating resin ..., said encapsulating resin curing at a temperature no greater than 120 degrees C"

Independent claim 5, as amended, recites:

"... providing a semiconductor detector array substrate comprising CdZnTe or CdTe having a plurality of metallized detector cell pads ... providing an interposer card ... a plurality of ... solder bumps ... at least one bump corresponding to at least one pad ... disposing an encapsulating resin as a fluxing agent and encapsulant between the interposer card and the semiconductor detector array substrate, the encapsulating resin having a curing temperature no greater than 120 degrees C; mating the interposer card ... to the semiconductor detector array substrate ...; heating the combined unit to a temperature not exceeding 120 degrees C ... said encapsulating resin at least partially curing at the same time as a process of reflowing the solder.

This combination, as set forth in the independent claims, defines a structure, which, despite the inherent weakness of the low eutectic temperature solder, has a substantial degree of mechanical strength. This is the result of the claimed combination of the acrylic and the ability of the acrylic to set during or after solder reflow.

The prior art shows arrangements in which solder bumps are used in assembly involving interposer assemblies, and shows the use of a solder having a m.p. of less than 120°. The prior art fails to suggest that an encapsulating resin be cured either during or after solder reflow, but at a low temperature consistent with the preservation of the integrity of the radiation sensor array. There is no suggestion in the prior art of record of using an encapsulating resin curing at a temperature no greater than 120 degrees C.

The use of an encapsulating resin curing at a low temperature is significant because it permits the use of a material which cures during (or after) solder reflow, and also allows cure without damaging the heat-sensitive sensor assembly. The prior art of record fails to show or suggest this feature. This configuration is contrary to the description found in Lingren, which

suggest this feature. This configuration is contrary to the description found in Lingren, which uses the pre-assembled plate 230, and is contrary to Spartiotis which clearly provides free space between the solder bumps as part of the assembly. This configuration is also contrary to *Capote '634*, which does not specify that the encapsulant must cure at 120 degrees C or less

Claims 2-4 and 6-19 further elaborate on the particular materials (claims 2-4 and 12-14) or the use of the low temperature materials (claims 6-11 and 15-19). These claims should be allowed for the same reasons that their parent claims should be allowed. Specifically, the claimed features in these claims are relevant to the inventive features defined in the independent claims.

Therefore, claims 1-17 as currently presented, and new claims 18-19, define over the prior art of record, and are believed to overcome the obviousness rejection. Applicant respectfully request that the Examiner withdraw the rejections and the case be passed to issuance.

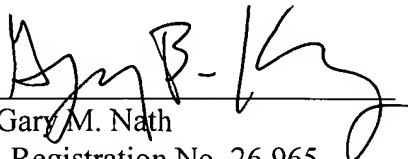
CONCLUSION

In light of the foregoing, Applicants submit that the application is in condition for allowance. If the Examiner believes the application is not in condition for allowance, Applicants respectfully request that the Examiner call the undersigned.

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